

- **Membrane module for cleaning membrane** filtration modules, comprises porous **membranes**, and a venturi device for providing entrained gas bubbles in a liquid flow which then passes through the **membrane**.

L20 ANSWER 80 OF 121 WPINDEX COPYRIGHT 2002 DERWENT INFORMATION LTD
AN 2000-293037 [25] WPINDEX
DNC C2000-088568
DC D15
IN JORDAN, E J; ZHA, F
PA (USFF-N) USF FILTRATION & SEPARATIONS GROUP INC; (USFI) US FILTER
WASTEWATER GROUP INC; (JORD-I) JORDAN E J; (ZHAF-I) ZHA F
CYC 90
PI WO 2000018498 A1 20000406 (200025)* EN 33p
RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW NL
OA PT SD SE SL SZ TZ UG ZW
W: AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK DM EE ES
FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS
LT LU LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ
TM TR TT TZ UA UG US UZ VN YU ZA ZW
AU 9961834 A 20000417 (200035)
EP 1115474 A1 20010718 (200142) EN
R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT
RO SE SI
US 2001047962 A1 20011206 (200203)
CN 1319032 A 20011024 (200213)
KR 2001079919 A 20010822 (200213)
ADT WO 2000018498 A1 WO 1999-AU817 19990924; AU 9961834 A AU 1999-61834
19990924; EP 1115474 A1 EP 1999-948614 19990924; WO 1999-AU817 19990924;
US 2001047962 A1 Cont of WO 1999-AU817 19990924; US 2001-815966 20010323;
CN 1319032 A CN 1999-811292 19990924; KR 2001079919 A KR 2001-703800
20010324
FDT AU 9961834 A Based on WO 200018498; EP 1115474 A1 Based on WO 200018498
PRAI AU 1999-1112 19990621; AU 1998-6217 19980925; AU 1998-6218
19980925
AN 2000-293037 [25] WPINDEX
AB WO 200018498 A UPAB: 20000524
NOVELTY - A **membrane** module (5) comprises porous
membranes (6) arranged in close proximity to one another and
mounted to prevent excessive movement, and a venturi device (12) for
providing, from within the module, gas bubbles entrained in a liquid
flow. The entrained liquid and gas bubbles
move past the surfaces of the **membranes** to dislodge fouling
materials.
DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for:
(a) scrubbing method of a **membrane** surface using a liquid
medium with gas bubbles entrained, including entraining the gas bubbles
into the liquid medium by flow of the liquid medium past a source of gas,
and flowing the gas bubbles and liquid
medium along the **membrane** surface to dislodge fouling materials;
(b) method of removing fouling materials from the
surface of porous hollow fibers mounted and extending longitudinally in an
array forming a **membrane** module as disclosed above;
(c) a **membrane** bioreactor including a tank which have the
membrane module as disclosed above; and
(d) method of operating a **membrane** bioreactor stated above
by introducing feed into the tank, applying vacuum to the fiber while
supplying gas bubbles.
USE - The **membrane** module is used for cleaning
membrane filtration modules, and is also used in a
membrane reactor.
ADVANTAGE - The advantages of the invention are:

(i) By using a venturi device, it is possible to generate gas bubbles to scrub **membrane** surfaces without the need for a pressurized gas supply;

(ii) The **liquid** and the **gas** phases are well mixed in the venturi and then diffuse into the **membrane** module to scrub the **membranes**. Where a jet type device is used to forcibly mix the **gas** into the **liquid** medium, a higher velocity of the bubble stream is produced. In treatment of wastewater, the thorough mixing provides excellent oxygen transfer;

(iii) The flow of gas bubbles is enhanced by the liquid flow along the **membrane** resulting in a large scrubbing shear force being generated, providing a positive fluid transfer and aeration with the ability to independently adjust flow rates of **gas** and **liquid**;

(iv) The injection of a mixture of two-phase fluid into the holes of the air distribution device can eliminate the formation of dehydrated solids and prevent gradual blockage of the holes;

(v) The injection arrangement provides an efficient cleaning mechanism for introducing cleaning chemicals effectively into the depths of the module while providing scouring energy to enhance chemical cleaning;

(vi) The module configuration allows higher packing density in a module without increasing solid packing. This adds an additional flexibility that the **membrane** modules can either be integrated into the aerobic basin or arranged in a separate tank;

(vii) The positive injection of a **mixture** of **gas** and **liquid** feed to each **membrane** module provides a uniform distribution of process fluid around **membranes**, thus minimizing the feed concentration polarization during filtration;

(viii) The filtration efficiency is enhanced due to a reduced filtration resistance; and

(ix) The cleaning method can be used to the treatment of drinking water, wastewater and the related processes by **membranes**.

DESCRIPTION OF DRAWING(S) - A schematic side elevation of the **membrane** module.

Membrane module 5

Membranes 6

Venturi device 12

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